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ABSTRACT

The nature of graduate education, the job market, and the problem of institutional self-renewal are considered. Trends of leveling off of graduate enrollment and of Ph.D. production and a dramatic increase in the level of postdoctoral training have occurred. The oversupply of Ph.D.-producing institutions and the need for financial support of graduate students so that institutions can maintain viable training programs are noted. Federal training support has continued to be reduced, and as financial support for students has shrunk, institutional costs have increased. Statistics illustrating increased costs in college operations are cited. Two other problems that threaten the job market and the future of graduate programs reside in the projections of the probable size of the student pool and the demography of the typical faculty. Statistics outlining the nature of these problems are cited. A flexible integration of the historical strengths of liberal education with the strengths of the professional school is proposed. The need for diversity in the advanced years of predoctoral training as well as in postdoctoral education, and the need to consider the private sector for new research and career opportunities are noted. (SW)

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GRADUATE EDUCATION FOR THE EARTHQUAKE GENERATION

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Frank Kessell is a remarkable fellow. He has instructed me, with-

out the hint of a snicker, to compound an educational prescription for the behavioral scientist of the future, and he has allowed me some twenty minutes to complete the task! Prescribing for the future is a fascinating game. It can be played by Horatio Alger and the Club of Rome alike with little apprehension about accountability. Indeed, the changing of a limited number of assumptions can make the difference between expectations of self-destruction and of survival. What at present appears to be perfectly plausible may in truth be extremely wide of a future mark. I am reminded that Alfred North White, that most reasonable of reasonable men, less than fifty years ago ventured the rather conservative prediction that in ten thousand years men might travel to the moon.

For well over a decade now thoughtful people have become increasingly concerned about the kind of world-in-crisis toward which we are being propelled. Cheap energy will soon be a thing of the past. A dollar-per-gallon gasoline once predicted for the 1990's is now, we are told, no more than months away. Alternative energy technologies, feasible on a major scale, remain a hope of the distant future. Nor is oil the only irreplaceable material facing rapid exhaustion. The annual consumption of materials in this country, now some 18 tons per capita, has an increasingly short doubling time, and, while levels and rates may be lower in less well

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developed countries, the pattern of consumption is the same. Competent estimates indicate mineral deposits to be adequate for from 50 to 75 years, but only at a staggering cost in pollution, in the expenditure of energy, in land use, and in political and social instability. As go our minerals, so go the biological systems upon which our food supply depends. All--marine food systems, croplands, grazing lands--are being steadily reduced. Even in China, prime farmland is being used as factory sites. And finally, although recent data on the world's most serious problem, rate of population growth, allow for cautious optimism in both the advanced nations and the Third World as well, the Earth's numbers will probably still increase from the present four billion to 5.8 billion in the next twenty years.

Many of the world's problems, I am confident, will be resolved by new physical technologies. The more intractable ones--the ones that reflect the problems of the unreconstructed human personality--must wait, I just as fully believe, upon contributions from fields such as ours and about these I am less sanguine. Whether we, in fact, find ourselves on the plains of Armageddon or alternatively just outside the walls of Paradise, one thing has become clear: we are entering a period of great discontinuity and change, and finding ways to accommodate to the interdependence of events, of people, and of nations is the first prerequisite to survival. In a recent study commissioned by the National Education Association, some 50 world citizens and 85 young people were asked what the world would be like in the next twenty or thirty years. The characteristics on which they all

most often agreed were as follows: continued acceleration in the rate of change; greater complexity as a result of technological breakthroughs; the emergence of alternative energy sources; a reexamination of the concepts of growth; increased crowding and hunger; continued pressure for human equity; increased demands by the less developed countries for a new economic order; troubled international relations; changing concepts of work and leisure; increased government debt and capital deficits; problems of governance and threats to freedom; and movement toward a post-extravagant society. One intriguing point of difference between young and old was found in the fact that the young people did not see themselves in a period of discontinuity and change and viewed the future as more or less a reflection of their current life style. But all held a cautiously optimistic view of the human prospect. This for some five reasons: humankind's impressive track record in dealing with its problems of survival heretofore; reforms already accomplished as a result of increased social consciousness; progress in the wise use of science and technology; improved social inventiveness; and the conviction that trends do not dictate human destiny. Which leads me to why we are here today. The one thing that binds all of us on this panel and in this audience together, I assume, is the abiding conviction that what we do is of critical importance not only to the welfare of the special community within which we make our lives but to the welfare of society as a whole. The continued integrity of a society that grows inevitably more complex with the elaboration of its technological base we believe to be inextricably linked

to our ability, and the ability of people like us, to provide the right kind and amount of graduate and professional education for some appropriate number of the best and brightest of each succeeding generation.

Most of us here grew up in what variously has been called the Golden Age of Higher Education when there was a boundless optimism about the future of our society and the place of colleges and universities in it. To-day we find ourselves in a different circumstance. Despite the fact that we Americans live better and longer than we have ever before lived, we have become a disbelieving breed. The legacy of the sixties and seventies is a growing distrust of all our social institutions, including our colleges and universities, evidenced by absenteeism at the polls, tax revolts, and referenda on balanced budgets. This distrust, coupled with a stubborn inflation of the economy that is also a legacy of the sixties, is forcing a reassessment of what we do and how we do it. The environment for training itself has changed and the jobs and careers that we took for granted for our students are beginning to appear in doubt. You are by now familiar with the facts, but let me quickly review them for you.

Unemployment among scientists and engineers first emerged as a worry within the physical science community with the canceling of the SST project in the early 1970's. It is only now becoming a matter of concern for behavioral scientists in general and it has yet to reach the consciousness of certain sectors of our community. But it is inevitable that it will, for it is in the nature of all social systems that whatever affects the system as a

whole will also influence the condition of all of its parts. In 1977 a National Research Council survey of behavioral science doctoral placement experiences yielded indications of a moderate to critical surplus of Ph. D. 's from well over half of the departments surveyed. For example, in the academic sector, where the largest number of Behavioral scientists overall have been placed in the past, the available supply of Ph. D. 's increased by 6.8% per year between 1972 and 1977 while the demand indicators dropped by an annual 4.9%. This adverse trend in the labor market has been accompanied by a leveling off of enrollment and of Ph. D. production and by a dramatic increase in the level of postdoctoral training. While the number of Ph. D. 's produced between 1971 and 1976 increased about 4% a year in the nonclinical fields and 8% per year in the clinical, the rate since then has been about 1% and 3.5%, respectively. Meanwhile, the number of postdoctoral appointments has been growing since the early 1970's at a rate of 10% per year in the nonclinical fields and 25% in the clinical, and the departments surveyed expect this trend to continue at an average rate of at least 6% through the early 1980's. This increasing number of postdoctoral students may, of course, be a short-range hedging response to the labor market but it also quite likely reflects a felt need for broader, more diverse training as preparation for work in new career settings.

If the immediate job outlook is less than favorable, so also are the conditions under which graduate education must be carried out when these conditions are defined in terms of the styles and relative levels of support

that we experienced during our period of academic expansion. To begin with, there are probably now too many Ph. D. producing institutions. Harrison Shull, Chairman of the Commission on Human Resources of the Natural Research Council, in a recent overview of all graduate education, estimates that the Gross National Product of the United States in the late 1970's can comfortably support about 110 such institutions. There are, in fact, well over 400. In the behavioral sciences we continue to believe that the financial support of our predoctoral students is an important factor in our ability to maintain viable training programs. Well over half of the departments responding to the NRC survey reported that the availability of such support was an important determinant of their admissions policy, and Charles Kiesler, in a recent conversation with me, expressed the view that the problem of student support will be a predominant preoccupation of graduate training centers for at least the next five years. Although the treatment of the research enterprise during the Ford and Carter administrations has been most reassuring after the bleak days of the Nixon presidency, Federal training support has continued to exist only on a greatly reduced scale. Between 1973 and 1976 this support from all sources was reduced by 15% in the face of a roughly comparable inflation in the economy. During the same period, HEW support from all sources dropped by 14%. About half of the departments with training grants experienced a loss of traineeships. NSF has virtually left the fellowship business, and each year for the last several there have been threats to terminate all NIH and ADAMHA

training programs. This has thrown universities back on alternative resources, already overtaxed, and students have had to depend increasingly on personal savings, outside income, and loans.

As financial support for students has shrunk, institutional costs have increased. Nationwide, budgets have doubled since 1965. On the average, personnel costs have gone up 99% while that for service, supplies and equipment has increased by 110%. A typical example is the University of Missouri system where, in the last five years alone, operating expenses have increased 94%. During the same period, the Consumer Price Index went up 47%. The cost-element rising most rapidly is, of course, that for energy. Electricity, fuel, and other utilities that cost institutions \$100 in the mid-1960's now cost almost \$300. In my own University, where I, among others, must worry about paying the bills, energy costs doubled last year although our consumption was reduced. The costs of library books and journals, which are one of my special worries, in the last decade have gone up 200% and 300%, respectively. One major new cost source is the expense of compliance with the bewildering complexity of federal laws and agency regulations that have descended upon us in recent years. (I won't preach to you today on the threat that governmental regulation poses to academic and scientific freedom; some of you have heard my sermons on this theme on other occasions.) In a recent report, the American Council on Education indicates that these government-instigated costs have increased by as much as 2000% between 1965 and 1975. In one private university, for example, they increased from \$110,000 per

year to \$3.6 million per year. At Duke, we are now spending about \$2 million annually on compliance. Some notion of the impact of these costs upon institutions of higher education is gotten from the fact that they represent from 5 to 18% of net tuition revenues. Extrapolating costs from the middle 1960's forward, the National Center for Educational Statistics anticipates that by the middle 1980's average costs per student will be more than 30% higher in public institutions and 40% higher in private institutions than they are right now. My intuition tells me these are conservative estimates.

Two other problems that represent intractable threats to both the job market as most of us have known it and to the future of our graduate programs reside in the projections of the probable size of the student pool and the demography of the typical faculty. Let me deal with the demography of the faculty first. I need only tell you that average tenure levels hover nationally around 70% with the proportion of tenured members exceeding 90% in some institutions. Average age varies between the high 40's and early 50's. Given the new federal legislation on retirement, some of us old crocks will be around for as much as 20 years. Several years ago I did a little exercise with the data on the academic labor force in science and engineering, the data I know best. In 1975 there were 148,000 science and engineering faculty members in American colleges and universities. Of these, only an imperceptibly small number were below 25 years of age, some 25% were between 25 and 34, roughly 62% were between 35 and 54, while 11% were between 55 and 64, and only 2% were over 65. If all were

to be retained until age 70 and the number of academic positions were to be held constant--neither probably reliable assumptions--only about 30,000 faculty positions would open up by the year 2000. When you put together the data on inflation and on the structure of the typical faculty, the prediction of virtually 100% tenure is not beyond the realm of reason. The implications for the job market, the nature of graduate education, and the problem of institutional self-renewal are obvious. The role of the university in the dissemination of old knowledge will probably continue unimpaired; its responsibility for the generation of new knowledge may very well suffer.

But even if we solve the problem of faculty renewal, will we have sufficient numbers of students to populate our graduate programs? In 1975 the cohort of 18 year olds from which we drew our freshman classes consisted of four and a quarter million persons. By 1985 the number will have dropped to 3.6 million, and by 1992 to 3.2 million. It will not return to the 1975 level until well after the turn of the century. If we look at the pool of 18 to 24 year olds, the drop is less abrupt. By 1996 it will have decreased about 17% from 27.6 million to 22.9 million. By the year 2000, however, it will still be 11% below the 1975 level. Undergraduate enrollment projections prepared by the National Center for Education Statistics for the period 1975-1985 suggest that numbers could either stay at the current 11.5 million or increase to as many as 14.6 million. At present, the ratio of matriculants to graduates is 1.7 to 1. Should this relationship hold, graduate schools in the mid 80's could expect a potential applicant pool that is 20% larger than the current

one. Meanwhile, the Graduate Record Examination Board this fall reported a slight decline, relative to last year, both in total enrollments and in first-year enrollments and numbers of degrees awarded. This continues the trend toward retrenchment seen over the past several years but, of course, tells us little or nothing about the longer range outlook. Still it doesn't inspire confidence for the immediate future. For those of us who plan programs, perhaps as important as numbers are the projected changes in the college-age population. In 1965 the population was 12% non-white; by 1985 it will be 17% non-white and by 1995, 19%. In addition, increasingly more women are going to college, more highschool graduates are delaying entrance to college for from four to five years, more are choosing part-time study, and more are enrolling in community colleges.

One final matter needs to be addressed before I display the temerity of prescribing for the future. I refer, in the language of the marketplace, to the nature of our current products. I will not comment on overall quality--good, bad, or indifferent--although I have some exceedingly strong views on that. Rather I want to look at what kind of people they are, what their predominant interests are, what kinds of careers they aspire to, what work settings they seek out, etc. Of the roughly 4500 behavioral scientists studied by the National Research Council in 1977, all of whom had received their doctorates between 1971 and 1975, about three-fourths of the nonclinicians held academic appointments, as did approximately a third of the clinicians. Roughly 7 or 8% of the nonclinicians worked for the government, equally

divided between federal and non-federal agencies, and something over 20% of the clinicians were in government settings, again equally divided between the federal and non-federal sectors. Approximately 6% of the nonclinical group were employed by business or industry, with the largest proportion of these associated with the pharmaceutical industry; 17% of the clinical group were in this setting. Of the remainder, the largest number were clinicians working in hospitals and clinics.

The largest number (32%) were teachers. About a fourth were primarily engaged in research and development, although 78% of the sample, regardless of what they did, also said they did at least some research. Another 19% were administrators or otherwise managers, and still another 27% performed consulting or other professional services. Of particular interest is the fact that about a third of the total were in fields outside their doctoral specialties, primarily in other behavioral science areas. While the predominate aspiration still appears to be toward careers as scholar-teachers, there is clearly an increasing interest in service roles outside the academic setting that is partly a reflection of the job market but that is also the result of a heightened interest in public issues that began with the period of the Vietnam War.

What kind of people are these new Ph. D. 's? I can only answer that question with personal impressions which may indeed be highly idiosyncratic and that are derived from an admittedly limited sample of observations made during contacts with Duke graduate students in the last five years, during

visits to a small number of departments other than my own, and during employment interviews and the colloquiums associated with them. In a word, as professionals they are excessively narrow specialists, long on technique and short on a grasp of fundamental issues in their field as a whole, short on an understanding of its intellectual base, and short on a knowledge of its historical traditions. This gives me cause for concern on two counts. I am pessimistic that those who seek their careers in fundamental scholarship now lack the perspectives that give rise to truly significant insights--those broad, overarching flashes of understanding that precede conceptual breakthroughs that move a science forward. I am equally worried that those who seek to apply their skills in service-delivery roles will rapidly approach obsolescence. An engineering dean acquaintance of mine once told me that the typical graduate engineer, whose formal education takes five years, will be out of date five years after graduation. I, of course, can't cite the rate of obsolescence for behavioral scientists, but I can hardly imagine that it differs widely from that for engineers.

To understand how our current products have come to be what they are, it is necessary to recognize that since World War II our graduate schools have become professional schools. An organizational innovation, modeled on the 19th century German university, graduate schools were originally created for the education of teacher-scholars in the basic intellectual disciplines. Today they devote a significant portion of their resources to the training of a wide range of practitioner-specialists. One need only look at the listing

of degree programs in any graduate catalog to recognize the metamorphosis. In sum, and admitted or not, graduate education in the new dispensation is less a commitment to the 19th century ethos that centered on the love of knowledge and more preparation for a job to be done. This change in character is the result of a number of factors. First of all, a growth of interest in applications that is the inevitable by-product of the evolution of most intellectual disciplines. The emergence of industrial science in 19th century Germany occurred when, among other things, the universities had produced more scientists than could be appointed to teaching posts. Secondly, it is the result of thirty years of massive government funding and the involvement of universities in the National Agenda. Thirdly, it is associated with the almost absolute autonomy of academic departments that came about with high-level government funding. And finally, it represents a market response to the interests of students and the needs of potential employers of students.

All that I have said thus far is an elaborate preamble to the exercise of prescription. Prescription is a chancey business and I engage in it reluctantly and with the usual disclaimers. At the same time, I am willing to risk one strong assertion, namely, that the ends of scholarly study can no longer reside within themselves but must also accomodate, in one degree or another, the aspirations of the larger society. If I were to choose two verbs to summarize my advice, they would be broaden and diversify. These are words that describe the strategies of the prudent investor and we are talking, of course, about the development and deployment of a precious resource.

My first plea is to educate for breadth of perspective. This means a knowledge of the fundamentals of one's discipline as a whole and a reasonable familiarity with those of a cognate discipline or disciplines as well. In advocating a "back-to-basics" philosophy, I am not suggesting a lock-step curriculum. Rather I am proposing a flexible integration of the historical strengths of liberal education with the strengths of the professional school, a matter not so much of substance as of style.

This integration can occur, it seems to me, in two ways, laterally and vertically. Students should be strongly urged to seek educational enrichment in a systematic way outside their home departments and serious effort should be made to lower the institutional barriers between our undergraduate and graduate offerings. Indeed, I think that graduate departments might profitably consider the concept of early admissions for a limited number of bright and adequately motivated undergraduates. There is nothing that should encourage educational breadth more than removing the worry about admission to advanced training. For the behavioral sciences, breadth of experience means embedding our sciences in the real world more firmly than we have been wont to embed them in the past. Scholarship is not debased by being directed toward the concerns of ordinary life, for at its best it offers a deeper and, hopefully, more coherent vision of the human condition. To tie scholarship to the real world means to base our theories on practice. As Nathan Glazer says, practice observed, practice engaged in, practice analyzed. Furthermore, in these days of large-scale institutionalized

intervention, we especially need to be more familiar with the nature of the policy process, for a focus on policy issues forces attention to the role of context in behavior.

Second, I would urge that we recognize the need for diversity in the advanced years of predoctoral training as well as in postdoctoral education. When we have saturated the market with our products, we have either to turn students away and shut down our programs or to find new markets. I am personally delighted to see the growing interest, for example, in policy studies among behavioral scientists. (I would have only one word of caution in this regard. If, indeed, you are going to do policy studies, and if you are going to introduce your students to the policy process, then by all means get some firsthand experience in settings where policy gets made.) Time does not allow an exhaustive review of particular career alternatives. On earlier occasions, I have suggested several--behavioral science journalism, legislative staff work, systems science, social technology, and behavioral medicine. Rather let me say simply that as we plan for educational diversity, it is urgently important that we understand better than we now do the nature of the new roles and settings in which our students will find themselves. Furthermore, it is important to perceive professional education, whatever the profession, as a life-long involvement with learning. Accordingly, departments might well give attention to formal educational programs for all stages of our several professional careers. These could include workshops, seminars, and part-time instructional programs. The Masters

degree might well be revitalized to meet certain professional needs. The range and types of training site might profitably be broadened. Persons interested in policy research, for example, would find a period spent working for a legislative committee or a senior public administrator not only useful but, in fact, essential.

Finally, I would suggest that as we look to shaping our academic programs toward new research and career opportunities, we give greater attention to the private sector. Industry, nationwide, contributes almost as much as the Federal Government to the total national R and D enterprise and there is evidence of growing corporate interest in cooperative activities with universities. Indeed, the National Science Foundation now devotes a portion of its annual budget to stimulating such liaisons. After all, the best way to transfer technology is to transfer people.

Our nation's universities, and the behavioral science departments within them, share not so much a common purpose as a common diffidence. We can withdraw into our old ways and lose our lustre as did the German universities earlier in this century. Certainly what has passed as high science in our several fields, when shorn of its technical jargon and held at arm's length, too often doesn't really add up to much. While I have focused on the practical reasons for broadened and diversified if not new educational ventures, there is a more important purpose to be served. When the behavioral sciences become too preoccupied with their own formalisms, they are apt to lose contact with their ultimate objects of study, human nature

in society as both actually exist.

The uncertainties that graduate education faces today have been faced before. Crisis can lead to challenge. Let me end with an exhortation, whose origin I have long since forgotten: "Make no little plans; they have no magic to stir men's blood--make big plans, aim high in hope and work," for as Robert Louis Stevenson once opined, "To travel hopefully is better than to have arrived."